

LISTING OF CLAIMS

1 through 42. (cancelled)

43. (currently amended) An objective for use with light energy having a wavelength in the range of approximately 157 nanometers through the infrared light range, comprising:

at least one focusing lens having diameter less than approximately 100 millimeters receiving said light energy and transmitting focused light energy;

at least one field lens having diameter less than approximately 100 millimeters, receiving said focused light energy and transmitting intermediate light energy; and

at least one Mangin mirror element having diameter less than 100 millimeters receiving said intermediate light energy ~~through a back side thereof~~ and providing controlled light energy ~~from a front side thereof~~ through an immersion substance to a specimen;

wherein each focusing lens and each field lens is formed from a single glass material and aligned substantially along an axis, and further wherein said Mangin mirror element, said at least one focusing lens, and said at least one field lens are configured to balance aberrations therebetween, said aberration balancing reducing decenter sensitivity of the Mangin mirror element, said at least one focusing lens, and said at least one field lens.

44. (previously presented) The objective of claim 43, wherein said objective has a field size of approximately 0.15mm.

45. (previously presented) The objective of claim 43, configured to have a numerical aperture of approximately 1.2.

46. (previously presented) The objective of claim 43, wherein each lens used in the objective has a diameter of less than approximately 25 millimeters.

47. (previously presented) The objective of claim 43, said objective used with a microscope having a flange, wherein the flange may be located at least approximately 45 millimeters from the specimen during normal operation.

48. (previously presented) The objective of claim 47, wherein the flange may be located at least approximately 100 millimeters from the specimen during normal operation.

49. (previously presented) The objective of claim 43, further comprising at least one additional lens constructed from a second glass material.

50. (previously presented) The objective of claim 43, wherein the immersion substance is water.

51. (previously presented) The objective of claim 43, wherein the immersion substance is oil.

52. (previously presented) The objective of claim 43, wherein the immersion substance is silicone gel.

53. (previously presented) The objective of claim 43, wherein the objective is optimized to produce minimum spherical aberration, axial color, and chromatic variation of aberrations.

54. (previously presented) The objective of claim 43, wherein the at least one mangin mirror element is optimized to produce spherical, axial color, and chromatic variation of aberrations to compensate for aberrations induced by the focusing lens group.

55. (currently amended) An objective comprising:

at least one focusing lens having diameter less than approximately 100 millimeters receiving said light energy and transmitting focused light energy;

at least one field lens having diameter less than approximately 100 millimeters, receiving said focused light energy and transmitting intermediate light energy; and

at least one Mangin mirror element having diameter less than 100 millimeters receiving said intermediate light energy through ~~a back side of~~ said Mangin mirror element and providing controlled light energy through an immersion substance to a specimen;

wherein said objective is configured to provide broadband imaging while receiving light energy at wavelengths less than 400 nm and further wherein said Mangin mirror element, said at least one focusing lens and said at least one field lens are substantially aligned along a single axis and configured to balance aberrations therebetween, said aberration balancing reducing decenter sensitivity of the Mangin mirror element, said at least one focusing lens and said at least one field lens.

56. (previously presented) The objective of claim 55, wherein said objective has a field size of approximately 0.15mm.

57. (previously presented) The objective of claim 55, wherein said at least one Mangin mirror element comprises:

a single lens/mirror element comprising:

a substantially curved concave surface; and

a second minimally curved surface;

wherein both surfaces of the single lens/mirror element are reflective with small central apertures through which light energy may pass.

58. (previously presented) The objective of claim 55, said objective having a numerical aperture of greater than approximately 1.0 at the specimen.

59. (previously presented) The objective of claim 55, wherein each lens in the objective has a diameter of less than approximately 25 millimeters.

60. (previously presented) The objective of claim 55, said objective having an ability to be employed with a microscope having a flange, wherein the flange may be located less than no more than approximately 45 millimeters from the specimen during normal operation.

61. (previously presented) The objective of claim 55, wherein the lenses of the objective are constructed of no more than two glass materials.

62. (previously presented) The objective of claim 61, wherein the no more than two glass materials comprise fused silica and calcium fluoride.

63. (previously presented) The objective of claim 55, wherein the immersion substance comprises one from a group comprising water, oil, and silicone gel.

64. (previously presented) The objective of claim 55, configured to have a numerical aperture of approximately 1.2.

65. (currently amended) A method for inspecting a specimen, comprising:
providing light energy having a wavelength in the range of approximately 157 nanometers through the infrared light range;

focusing said light energy using at least one lens into focused light energy, where each lens used in said focusing has diameter less than approximately 100 millimeters;

receiving said focused light energy and converting said focused light energy into intermediate light energy; and

receiving said intermediate light energy through ~~a back side of~~ an optical element and providing controlled light energy from ~~a front side of~~ the optical element and through an immersion substance to a specimen;

wherein said optical element is configured to operate with said focusing light energy and receiving focused light energy to balance aberrations resulting from the focusing, receiving focused light energy, converting, receiving intermediate light energy, and providing controlled light energy.

66. (previously presented) The method of claim 65, wherein said method results in a field size of approximately 0.15mm.

67. (previously presented) The method of claim 66, wherein said providing, focusing, focused light energy receiving, and intermediate light energy receiving results in a field size of approximately 0.15mm.

68. (previously presented) The method of claim 66, providing, focusing, focused light energy receiving, and intermediate light energy receiving results in a numerical aperture of approximately 1.2.

69. (previously presented) The method of claim 66, wherein each lens used has a diameter of less than approximately 25 millimeters.

70. (previously presented) The method of claim 66, said method employed with a microscope having a flange, wherein the flange may be located at least approximately 45 millimeters from the specimen during normal operation.

71. (previously presented) The method of claim 70, wherein the flange may be located at least approximately 100 millimeters from the specimen during normal operation.

72. (previously presented) The method of claim 66, wherein only two glass materials are used for lenses.

73. (previously presented) The method of claim 66, wherein the immersion substance is water.

74. (previously presented) The method of claim 66, wherein the immersion substance is oil.

75. (previously presented) The method of claim 66, wherein the immersion substance is silicone gel.

76. (previously presented) The method of claim 66, wherein providing, focusing, focused light energy receiving, and intermediate light energy receiving is optimized to produce minimum spherical aberration, axial color, and chromatic variation of aberrations.

77. (previously presented) The method of claim 66, wherein the providing, focusing, focused light energy receiving, and intermediate light energy receiving is optimized to produce spherical, axial color, and chromatic variation of aberrations to compensate for aberrations induced.

78. (currently amended) An objective for use with light energy having a wavelength in the range of approximately 157 nanometers through the infrared light range, comprising:

at least one focusing lens receiving said light energy and transmitting focused light energy;

at least one field lens receiving said focused light energy and transmitting intermediate light energy; and

at least one Mangin mirror element having diameter less than 100 millimeters receiving said intermediate light energy ~~through a back side thereof~~ and providing controlled light energy through an immersion substance to a specimen;

wherein said Mangin mirror element, said at least one focusing lens and said at least one field lens are substantially aligned along a single axis and configured to balance aberrations therebetween, said aberration balancing reducing decenter sensitivity of the Mangin mirror element, said at least one focusing lens and said at least one field lens.

79. (previously presented) The objective of claim 78, wherein said objective has a field size of approximately 0.15mm.

80. (previously presented) The objective of claim 78, configured to have a numerical aperture of approximately 1.2.

81. (previously presented) The objective of claim 78, wherein each lens used in the objective has a diameter of less than approximately 25 millimeters.

82. (previously presented) The objective of claim 78, said objective used with a microscope having a flange, wherein the flange may be located at least approximately 45 millimeters from the specimen during normal operation.

83. (previously presented) The objective of claim 82, wherein the flange may be located at least approximately 100 millimeters from the specimen during normal operation.

84. (previously presented) The objective of claim 78, wherein only two glass materials are used.

85. (previously presented) The objective of claim 78, wherein the immersion substance is water.

86. (previously presented) The objective of claim 78, wherein the immersion substance is oil.

87. (previously presented) The objective of claim 78, wherein the immersion substance is silicone gel.

88. (previously presented) The objective of claim 78, wherein the objective is optimized to produce minimum spherical aberration, axial color, and chromatic variation of aberrations.

89. (previously presented) The objective of claim 78, wherein the at least one Mangin mirror element is optimized to produce spherical, axial color, and chromatic variation of aberrations to compensate for aberrations induced by the focusing lens group.

90. (currently amended) An objective for use with light energy having a wavelength in the range of approximately 157 nanometers through the infrared light range, comprising:

at least one focusing lens receiving said light energy and transmitting focused light energy;

at least one field lens receiving said focused light energy and transmitting intermediate light energy; and

at least one Mangin mirror element having diameter less than 100 millimeters receiving said intermediate light energy ~~through a rear side thereof~~ and providing controlled light energy through an immersion substance to a specimen

wherein said Mangin mirror element, said at least one focusing lens and said at least one field lens are substantially aligned along a single axis and configured to balance aberrations therebetween, said aberration balancing reducing decenter sensitivity of the Mangin mirror element, said at least one focusing lens and said at least one field lens.

91. (previously presented) The objective of claim 90, wherein said objective has a field size of approximately 0.15mm.

92. (previously presented) The objective of claim 90, wherein said at least one Mangin mirror element comprises:

a single lens/mirror element comprising:

a substantially curved concave surface; and

a second minimally curved surface;

wherein both surfaces of the single lens/mirror element are reflective with small central apertures through which light energy may pass.

93. (previously presented) The objective of claim 90, said objective having a numerical aperture of greater than approximately 1.0 at the specimen.

94. (previously presented) The objective of claim 90, wherein each lens in the objective has a diameter of less than approximately 25 millimeters.

95. (previously presented) The objective of claim 90, said objective having an ability to be employed with a microscope having a flange, wherein the flange may be located less than no more than approximately 45 millimeters from the specimen during normal operation.

96. (previously presented) The objective of claim 90, said objective employing no more than two glass materials.

97. (previously presented) The objective of claim 96, wherein the no more than two glass materials comprise fused silica and calcium fluoride.

98. (previously presented) The objective of claim 90, wherein the immersion substance comprises one from a group comprising water, oil, and silicone gel.

99. (previously presented) The objective of claim 90, configured to have a numerical aperture of approximately 1.2.